

### REMARKS

Applicants have recited in claims 1, 34, and 42 a particular order of the recited optional steps, i.e., the steps are performed in the sequence as listed in each of the claims. No new matter has been introduced by these amendments. Specifically, although original claims 1, 34, and 42 did not explicitly specify this particular order, it is inherent that the steps recited therein are performed in the order as listed. For example, claim 1 sequentially recites “generating magnetic nanoclusters in gas phase” and “heating the magnetic nanoclusters.” It is clear that the generating step is performed first so as to provide magnetic nanoclusters for the heating step.

Of note, it appears to be the Examiner's position that absent recitation of the order, original claims 1, 34, and 42 should be broadly interpreted to cover methods including the recited steps in any order. Applicants do not agree, but have nevertheless amended the claims to eliminate any ambiguity. In any event, it is clear that the Examiner has already searched on and considered these claims based on the broadest interpretation, i.e., the recited steps performed in any order. Thus, he has considered and examined a special order, i.e., the recited steps performed in the particular order now recited in claims 1, 34, and 42. In other words, the amendments to claims 1, 34, and 42 do not necessitate further search and consideration.

Also, Applicants have followed the Examiner's suggestion to replace “upon deposition” with “during deposition” in claims 12 and 42 to promote clarity.

As indicated by the Examiner, he has conducted search and examination with regard to “upon deposition” recited in claims 12 and 42 in its broadest interpretation, including “during deposition.” Thus, replacing “upon deposition” with “during deposition” also does not necessitate further search and consideration.

Claims 1, 7-10, 12-15, and 34-48 are currently pending. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

### Rejection under 35 U.S.C. § 102(e)

The Examiner rejects claims 1, 12, 42, and 45 for anticipation, relying on Shimizu et al., U.S. Patent Application Publication 20030091868 (Shimizu). Claims 1 and 42, the two independent claims, will be discussed first.

Claim 1 covers a method for forming a thin film magnetic recording medium by sequentially (1) generating magnetic nanoclusters in gas phase, (2) heating the magnetic nanoclusters, (3) crystallizing the magnetic nanoclusters, and (4) depositing the magnetic nanoclusters onto a substrate to form a thin film. In other words, claim 1 requires heating the magnetic nanoclusters before the depositing step.

Shimizu teaches producing a magnetic recording medium by sequentially forming on a substrate a soft undercoat film, an orientation-regulating film, a perpendicular magnetic film, and a protective film. See paragraph 0031. According to this reference, the undercoat film can be prepared by sputtering magnetic material. It is the Examiner's position that the sputtering process includes generating clusters of magnetic material, colliding the clusters to form crystals, and depositing the crystals on a substrate. See the final Office Action, page 5, lines 1-4. Further relying on Shimizu's disclosure of heating the cluster-containing undercoat film, the Examiner concludes that Shimizu teaches all the limitations of claim 1. See the final Office Action, page 5, lines 4-6.

Applicants would like to point out that, in the Shimizu method, after the undercoat film is formed, the clusters generated by sputtering have already been deposited on a substrate. Shimizu teaches heating the undercoat film. See paragraph 0142. It follows that this reference teaches heating the clusters after they have been deposited on the substrate. By contrast, claim 1 requires heating nanoclusters before they have been deposited on a substrate. Thus, it is clearly not anticipated by Shimizu.

Applicants now turn to claim 42. Claim 42 covers a method for forming a thin film magnetic recording media, which includes (1) generating magnetic nanoclusters, (2) crystallizing the magnetic nanoclusters, and (3) depositing the magnetic nanoclusters onto a substrate to form a thin film of magnetic particles thereon. The method further includes providing a magnetic field adjacent to the substrate to control the orientation of the magnetic particles during deposition.

Shimizu's recording system is used to write data on a magnetic recording medium, which contain magnetic nanoclusters. In their response to the first office action dated February 10, 2006, Applicants argued that, at the time that the data is written on a magnetic recording medium, the magnetic nanoclusters have already been deposited on the substrate of the magnetic

recording medium. In other words, Shimizu teaches applying a magnetic nanoclusters after deposition, an order different from that required by claim 42.

In the final office action, the Examiner asserts that “upon deposition” can be broadly interpreted “to mean at the time of deposition or thereafter, or once deposition has occurred.” See the final Office Action, page 3, lines 1-2. He therefore maintains the rejection and suggests replacing “upon deposition” with “during deposition.” See page 3, lines 11-13.

Applicants have amended claim 42 as suggested by the Examiner. The method covered by claim 42, as amended, is different from that disclosed in Shimizu for the reasons set forth in the response to the first office action.

In view of the above remarks, Applicants submit that claims 1 and 42 are novel over Shimizu. By the same token, claim 12, dependent from claim 1, and claim 45, dependent from claim 42, are also novel over Shimizu.

#### Rejection under 35 U.S.C. § 102(b)

The Examiner rejects claims 1, 9, 10, 34, and 37 for anticipation, relying on Ryonai et. al., U.S. Patent No. 6,242,085 (Ryonai). Claims 1 and 34, the two independent claims, will be addressed first.

As discussed above, claim 1 requires heating the magnetic nanoclusters before the depositing step.

Ryonai discloses a thin film magnetic recording medium including a glass substrate, an underlying non-magnetic layer, a magnetic layer, a protective layer, and a lubricant layer. See column 3, lines 44-48. The magnetic layer is formed by generating magnetic nanoclusters and crystallizing the nanoclusters on a substrate having an underlying non-magnetic layer. See column 4, lines 3-12. Ryonai also teaches that “[a]s the substrate temperature is raised, the growth of the magnetic crystals is accelerated.” See column 6, lines 37-38.

When responding to the first Office Action, Applicants argued that claim 1 is different from Ryonai as the former requires that a heating step be performed before a depositing step while the latter teaches that heating and depositing steps are performed at the same time. In response to these arguments, the Examiner asserts that “[t]here is nothing in claim 1 that requires

an order of the claimed steps, or specifically heating before crystallizing and depositing.” See the final Office Action, page 3, lines 16-17.

Applicants again would like bring to the Examiner's attention that it is inherent that the steps recited in claim 1 are performed in the order as listed. See page 6, lines 3-8, *supra*. In any event, claim 1 has been amended to explicitly recite this order. In view of the remarks set forth in their response to the first Office Action, Applicants submit that claim 1 is not anticipated by Ryonai.

Claim 34, the other independent claim, covers a method for forming a thin film magnetic recording medium by sequentially (1) generating magnetic nanoclusters in gas phase, (2) mixing the magnetic nanoclusters with non-magnetic material, (3) crystallizing the magnetic nanoclusters, and (4) depositing the magnetic nanoclusters onto a substrate to form a thin film. In other words, claim 1 requires mixing the magnetic nanoclusters with non-magnetic material after generating them.

Ryonai teaches a thin film magnetic recording medium including, among others, a magnetic layer, which includes magnetic crystals dispersed in non-magnetic material. See column 4, lines 3-6. It also teaches that this magnetic layer can be obtained by either sputtering a mixture of magnetic material and non-magnetic material or sputtering magnetic material and non-magnetic material separately but simultaneously. See column 5, lines 1-11. In the former process, the non-magnetic material and magnetic material are mixed beforehand. In the latter process, the magnetic material and non-magnetic material are vaporized before the magnetic material forms clusters and then crystals. The magnetic vapor and non-magnetic vapor are mixed as soon as they are generated. In other words, the magnetic material is mixed with the non-magnetic material before forming magnetic clusters. As both sputtering processes taught in Ryonai necessitate mixing the magnetic material and non-magnetic material before generating magnetic clusters, they are clearly different from the method of claim 34, which requires that the mixing step be performed after the generating step. Thus, Ryonai does not anticipate claim 34.

For the reasons set forth above, claims 9 and 10, dependent from claim 1, and claim 37, dependent from claim 34, are also not anticipated by Ryonai.

Rejections under 35 U.S.C. § 103(a)

The Examiner rejects for obviousness (1) claims 13-15 and 46-48, relying on Shimizu; and (2) claims 12-15, 38-42, and 45-48, relying on Ryonai in view of Shimizu.

The patentability of claims 12-15 resides at least in part in heating magnetic nanoclusters before depositing them on a substrate, a limitation recited in claim 1 from which claims 12-15 depend (referred to as limitation 1 below). The patentability of claims 38-41 resides at least in part in mixing magnetic nanoclusters with a non-magnetic material after generating magnetic nanoclusters, a limitation recited in claim 34 from which claims 38-41 depend (referred to as limitation 2 below). The patentability of claims 42 and 45-48 resides at least in part in providing a magnetic field adjacent to a substrate to control the orientation of magnetic particles during their deposition, a limitation recited in claim 42 from which claims 45-48 depend (referred to as limitation 3 below).

As already discussed above, neither Shimizu nor Ryonai teaches or suggests any of limitations 1, 2, and 3. Thus, claims 1, 12-15, 38-42, and 45-48, each of which requires at least one of the three limitations, are not rendered obvious by these two references, either alone or in combination.

Allowable subject matter

The Examiner acknowledges that claims 7, 8, 35, 36, 43, and 44 cover allowable subject matter. However, he objects to these claims for depending from rejected base claims, i.e., claims 1, 34, and 42. As discussed above, the rejections of claims 1, 34, and 42 are believed to have been overcome. Thus, claims 7, 8, 35, 36, 43, and 44, as now pending are in condition for allowance.

CONCLUSIONS

Applicants submit that the rejections asserted by the Examiner have been overcome and claims 1, 7-10, 12-15, and 34-48, as pending, are novel and unobvious over the cited prior art references. Applicants therefore respectfully request that all pending claims be allowed.

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Enclosed is a \$120 check for the Petition for Extension of Time fee. Please apply any charges to deposit account 06-1050, referencing Attorney's Docket No. 17184-002001.

Respectfully submitted,

Date: 11-20-06

Y Rocky Tsao  
Y. Rocky Tsao, Ph.D., J.D.  
Attorney for Applicants  
Reg. No. 34,053

Fish & Richardson P.C.  
225 Franklin Street  
Boston, MA 02110  
Telephone: (617) 542-5070  
Facsimile: (617) 542-8906